THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

No. 112. APRIL 1846.

XXX.—*Observations on the Tribe* Sphæriaceæ, *and descriptions of certain new Genera.* By Prof. Giuseppe de Notaris. Florence*, 1844. 4to.

By means of the immortal works of Bulliard, Persoon, Fries, Kunze, Nees, Greville and others, mycology has made of late years surprising progress, although it still continues in some of its parts very inferior to the other branches of cryptogamic botany. This arises, if I mistake not, from an opinion unfortunately adopted by certain writers of authority, who have not hesitated to assert, that microscopic observations instead of conducing to happy results are prejudicial to the study of mycology, and are the perpetual fountain of error and confusion. This opinion I not only hold to be false, but even incompatible with the present exigences of the human mind, which cannot content itself with the superficial exterior of things, but delights in searching into their most secret recesses.

And what, in truth, was the study of Cryptogamia before the compound microscope, thanks to the pains taken by the enlightened Amici, was brought to its present degree of perfection? The microscope has unveiled to us, not to speak of the surprising discoveries in bryology, lichenology and algology, the various ways in which fungi are reproduced, which, whether from the singularity of their forms, their hidden mode of growth, or the excessive minuteness of their parts, were the subject of very insufficient observations. How mycology has advanced since the late improvement in microscopic observations, the works of Vittadini, Corda, Montagne and Berkeley bear incontestable evidence.

No one is ignorant that Persoon and Fries made the study accessible by defining the limits of the families, properly describing the species, and laying the foundation of the natural system;

* Translated from the Italian. Communicated by the Rev. M. J. Berkeley. This memoir, which was first published as a separate pamphlet in 4to, has since appeared in 'Giornale Bot. Italiano,' edited by Parlatore.

but from having too often preferred characters more ready of access to those of internal structure, and trivial differences to the organs of fructification, they led students astray from the analytic method formerly adopted by the immortal Micheli, who, assisted by the power of their own minds, would otherwise have guided them by a surer and more noble path. The works of Micheli were often consulted, but his observations were either carelessly passed over or considered incomprehensible, and we have seen several of our contemporaries advance facts as new which had already been published in the 'Nova Plantarum Genera.'

Of all the divisions of the mycological kingdom, that of the *Pyrenomycetes* or *Hypoxyla* especially appears to me most strikingly to prove what I have above asserted. Analyse the works of Persoon, Fries, Duby, Wallroth and Chevalier, and you will find the form and colours of the perithecia, the way in which they open, the mode in which they burst from the matrix, the stroma, the colour, the consistence of the nucleus, accurately described; but of the parts of which the nucleus itself is composed, of the parts in which the essential and classical characters really reside, of the fructification, of the internal structure of the conceptacula, there is no intimation whatever, or they give them joined to the others as of secondary importance and out of mere compliment.

Thus it is that in this family myriads of errors and contradictions are met with at every step. We find, for example, some species of *Sphæria* placed among the *Cytisporæ*, because the nucleus bursts from the perithecium in the form of a tendril; to *Lophium* we find pulverulent sporidia assigned, because they are thread-shaped and equal in length to the asci. Among the *Sphæriæ* we find species which have the nucleus composed of sporidia only—species which belong to *Sphæronema*, and in short true *Peziæ*, because in colour, form, and mode of growth they present the semblance of a perithecium.

Among the general characters of Fries' sections of the immense genus *Sphæria*, based principally and sometimes with useless details on the existence or want of a stroma, or on the mode in which the perithecia are disposed, we certainly find the asci and sporidia mentioned, but the sporidia in the same sections differ immensely in the several species in form, structure or size. We find allied species dispersed in different sections or even identical species, solely from their having attacked vegetables of different families or parts of different duration.

I do not hesitate to assert this, having had the advantage of procuring an authentic copy of the entire collection of the *Scleromycetes Suecici* of Fries, possessing also the greater part of the types published in the 'Fasciculi' of the enlightened Prof. Kunze, those illustrated by Montagne in his 'Notice sur les Plantes

Cryptogames récemment découvertes en France,' and in the third edition of the 'Flore des environs de Paris' of Merat, and the collections of Demazières and others, with the help of which I have been able to make a multitude of comparisons and clear away no slight number of errors;—errors which, without further preface, appear to me incontestably to demonstrate—

1st. That the progress in cryptogamic botany is chiefly owing to microscopical observations.

2ndly. That the classification of the *Pyrenomycetes* especially can never be natural nor philosophical, until we know the most minute particulars of the fructification of the species.

Besides which, if in the classification of many other tribes of fungi, and in defining the genera and species of the *Perisporiacei, Myxogastres, Mucorini, Coniomycetes,* &c., part of the characters are furnished by the peridia and sporidia, why should such characters be altogether rejected in the *Pyrenomycetes,* in which these organs are more complicated, and consequently rank higher in the series of organized structure?

The suspicion that differences in the fructifying parts of the genus *Sphæria* might be found, had arisen in my mind from the first moment in which I prepared myself to examine analytically a few minute fungi, which I afterwards described and figured in my decades of *Micromycetes.* During last winter, however, having previously excluded those species in which I had not succeeded in finding a *nucleus ascigerus,* I prepared with the utmost diligence of which I was capable, the analysis, descriptions and figures of 200 other *Sphæriæ*; and I assert that in identical species, from whatever different region they came, and these often growing on plants of different families, I have always found the structure, size, colour and shape of the sporidia identical; while, on the contrary, species properly distinct have never presented to me sporidia of the same shape. How many times have I admired in ecstasy the inexhaustible fullness of the great Creator of all things, who has given to an organ essentially the same in its nature and office such an infinite variety of form, so that each species carries with it an invariable impress or token to distinguish it from its allies!

Still very far from the end I had proposed to myself, from want of time, and not being able to embrace a larger field, I confine myself at present to a notice respecting the tribe of indigenous *Pyrenomycetes Sphæriaceæ,* because on recurring to the examination of the most essential parts of the fruit, they exhibit on a small scale the basis on which I intend to proceed in their re-arrangement; re-arrangement I say, because Greville, Corda, Montagne, and Fries himself in the 'Plantæ Homonemeæ' felt the urgent necessity of lending a hand in the dismemberment of

the genus *Sphæria*, proposing the genera *Diplodia*, *Ostropa*, *Cucurbitaria*, *Cryptosphæria*, *Valsa* and *Hypocrea*, which conveniently limited according to the characters of fructification common to the greater number of the respective species, and selected from the heterogeneous materials which they everywhere contain, ought without doubt in some measure to be adopted, although for the most part founded on the appearance of the stroma, perithecia and nucleus, characters comparatively of small value.

I comprehend among the *Pyrenomycetes Sphæriaceæ*, those species only in which we meet with truly ascigerous conceptacula or perithecia, whether spheroidal, lentiform, conical, oval; whether obtuse or acute, or finally produced into a kind of cylindrical neck, angular or compressed, isolated or gregarious, or collected together in a stroma of varied form; opening by means of a vertical pore, sometimes scarcely visible or gaping in consequence of the thinness of the exterior coat, which yields readily to the shock of the sporidia bursting forth from the asci when arrived at maturity, or of the asci themselves separated from the walls of the perithecia, or in short by means of an irregular fissure.

The limits indeed within which the celebrated Corda has circumscribed the tribe or family of the *Sphæriaceæ*, in his immense iconographical work on the family of Fungi (Icones Fungorum, vol. v. p. 31), might be adopted for the present, had he not as I believe comprised in it genera which do not properly belong to it, and for the most part defined too loosely.

In the *Sphæriaceæ* we have to consider the stroma, the perithecium, its texture, the mode in which it opens, the nucleus, the asci, the paraphyses and the sporidia.

The stroma, on which the fundamental divisions of Fries are based, furnishes characters of some importance in the greater part of compound *Sphæriæ*, which, besides serving as a receptacle for the perithecia, presents a determined form characteristic of each species. The stroma cannot properly be compared to the thallus of Lichens, because it is an integral part of the fructifying apparatus. From the mycelium, the true equivalent of the thallus, one can scarcely draw materials for the diagnosis of the genera, because it is always extremely difficult to follow up its development. Deeply invested in the substance of the matrix or confluent with it, and often evanescent in fructifying individuals, it cannot afford precise characters except by the help of observations, often perhaps impracticable, and attentively following up the development before the evolution of the perithecia. In the simple, free, superficial or innate species, and in the *Cæspititiæ*, the nature of the stroma appears less clear, because in some species

it is preceded by the appearance of the perithecia. In many of the *Obvallatæ, Pertusæ, Denudatæ, Caulicolæ,* and analogous tribes of Fries, the matrix at first appears unaffected; neither do we see it penetrated by the stromatic substance, if it has not already completed the development of the perithecia; for which reason I should feel inclined to regard this indeterminate form of stroma either as the result of a peculiar disorganization induced in the substance of the matrix from the corroding action of the conceptacula as the rudiments of abortive perithecia, or in short as a sort of secretion from the conceptacula themselves which filters through the pores of the matrix, or is diffused on their surface and by degrees vanishes.

This latter mode in which the stromatic substance originates is a fact repeated in a multitude of species, and which has to a certain extent some analogy with the changes effected in the more superficial strata of the bark in woody dicotyledonous plants, in which the external cells of the cortical parenchyma have not become inert and modified in their qualities and appearance by the continual action of atmospheric agents, though certainly by the progressive deposit of the superfluous nutritive particles.

However this may be, I refer to the *Simplices* all those species of the first division of Fries in which the stroma has no determined and constant figure nor free evolution, in consequence of which I unite, according to their real affinities, many forms which till now have been ascribed to separate sections; for example, *Sphæria leioplaca* and *S. miliaria* of the *Concrescentes* to *S. entypa* and *S. inquilina* of the *Obtectæ*. And why may we not believe, from the great similarity of the simple species to certain *Verrucariæ,* that we shall be able to clear up the same aberrations in the *Sphæriæ* which so often recur among the lichens with a centrifugal thallus, in which we find apothecia developed independently of the thallus? I must however add, that I have never met with isolated independent perithecia of the same form as those in any of the stromatic or compound species. Besides, the differences of the sporidia in the species of the types just indicated are adjusted; differences, which when clearly expressed may be assumed as the fundamental hinge of the primary divisions analogous to those adopted by Fries.

In the works of the above-mentioned authors, the particulars relative to the configuration of the stroma are minutely described; it therefore appears to me superfluous to say more about it. Many, on the contrary, would like to discourse about the nature, use, and signification of the tomentose subiculum with which the perithecia are girt in the *Byssisedæ* and various other sections. This structure does not necessarily indicate affinity; but I dare

not now, for want of direct observations, announce the opinion I have formed.

The perithecia in compound *Sphæriæ* are found more or less deeply inserted into the stroma; in the simple species they may be free or innate, isolated, fasciculate, gregarious or otherwise. Their structure deserves the highest attention: the perithecium in some species consists of a membranaceous, elastic, transparent, reticulated sac, constituted of a single stratum of very much compressed cellules; in others it is made of minute, round or angular cells of varied dimensions, containing a peculiar substance for the most part of a fuliginous colour. The consistence, thickness, fragility or tenacity depend on the greater or smaller number of the cellular elements, which arranged in one or more strata concur to form the walls, their size and reciprocal cohesion. Sometimes they consist of an apparently anhistous membrane similar to the stratum, which by means of maceration may be separated from the epidermis of the leaves of phænogamous plants.

If the simple *Sphæriæ* presented constantly a perithecium of a cellular structure, or to speak more correctly, of a stratum of concentric cells, we should think their external coat corresponded to the stroma or receptacle which unites the perithecia in the compound species; but in these as well as the others both forms occur. I should rather say that the apparently anhistous perithecium was analogous to the peridiola of the *Mucedines*, the other to the peridia of some *Gastromycetes*.

The *Sphæriaceæ*, I remark by the way, by the symmetry of their parts and their ascigerous fructification, have a great analogy to the *Discomycetes*, were it not that the excipulum generally speaking has a filamentous instead of a cellular structure.

The neck of the perithecium, which is highly developed both in certain vertical and innate stromatic *Sphæriæ*, and in simple species deeply buried in the matrix, does not furnish characters of primary importance. The transitions from *Coopertæ* to *Ceratostomæ* are notorious, and from the latter to *Platystomæ*, &c.

The asci and paraphyses, or the asci alone, constitute the nucleus, the constant property of which in growing individuals is to present the character of a gelatine of a whitish, cinereous or slightly fuliginous tint. The differences depend essentially on the particular state of the asci, and the manner in which the sporidia of these and the perithecia are set at liberty. When humidity is wanting, the primary element in the life of *Pyrenomycetes*, the nucleus nearly vanishes, being reduced to a sort of down or to a thin crust which lines the base or cavity of the perithecia.

Nothing can be added respecting the anatomy of the asci, sporidia and paraphyses which has not already been registered in the

later works of Montagne, Berkeley and Corda. I shall observe however that the asci present two essential modifications which correspond with the characters of the nucleus.

When the perithecium has an anhistous appearance and the nucleus is amylaceous, the asci from the moment in which they become visible under the microscope are found detached from the walls of the perithecium and steeped, so to speak, in a sort of mucous matter, in which we may frequently observe little bubbles. I never succeeded in determining what relation these had to the walls of the perithecium, but I am almost inclined to think that the formation of the asci is repeated by a process similar to that by which pollen is developed in the cavity of the anthers. All species of analogous structure seem constituted of a single membrane, which, when the inclosed sporaceous mass has scarcely divided itself into sporidia, is re-absorbed or dissolved in the water with which the perithecia are penetrated, and entirely disappears. The sporidia however adhering together preserve for some time their normal position, and are seen dispersed in the surrounding mucous matter in groups or rows of eight which retain the figure of the asci, and often show traces of a thread, which, proceeding from the inferior sporidium, is lost in the mucous matter in which the sporidia are suspended.

The sporidia in the species belonging to the series in question are very small, cylindrical in shape, mostly curved, continuous or obscurely septate, transparent and of a yellowish colour, like oil or pearls. Each of the sporidia frequently incloses a sporidiolum of a roundish form, and which is endued with a rapid motion when liberated, as may be observed if one is isolated in a drop of water on the object-glass. The paraphyses are scarcely to be traced at all, or are entirely wanting.

Besides the case described, the asci, whether they spring from the base of the perithecium or from the surface of its internal walls, often remain adhering by their base, which is generally attenuated like a peduncle, and preserve for an indefinite time and even to the maturity of the sporidia their position, by which the study of them is rendered much less difficult. It is easy to see in them the internal membrane which lines the walls.

In the species of this series the various forms of the sporidia are innumerable; spherical, elliptic, reniform, semilunar, semicircular, lanceolate, fusiform, cylindrical, filiform, straight, curved, contorted, sigmoid, didymous, simple, articulate, cellulose, polished, facetted, torulose, provided with membranaceous appendages, diaphanous, trapezoidal, &c. The episporium is most evident in them, and sometimes equal in thickness to the endosporium.

When the development of the sporidia is completed, the asci

commonly open above. In some species they are provided with a thick border or a particular appendage, to which the perithecium* is attached, in which case the evacuation of the sporidia may be effected from the inferior side. If the asci and sporidia do not all come to maturity at the same time, it is easy to observe all the phases of their development;—an argument with which I shall occupy myself in detail when I come to discuss the merit of the fundamental divisions of the whole tribe.

In only two Sphærias, *S. profusa*, Fr., and *S. macrospora*, nob., I have yet found the asci tetrasporous. In the greater number they are octosporous and uniseriate: in very few cases are they polysporous.

The nucleus when constituted of asci only bursts through the perithecium in the form of a turbid stream which flows on the matrix, or if of a denser consistence, assumes the form of a little cirrhus; a property which, though rare, is even repeated in the species which possess asci of longer duration.

Finally, I expect to be able to draw part of the distinctions of the genera from the paraphyses, whenever they offer the character of separate organs distinguished from the asci by their filamentous form and the articulations with which they are interrupted at intervals. Under other forms and when inarticulate, they may be regarded as asci in a rudimental state, and indeed there are many species in which they are totally wanting in the most fully developed individuals. Examples of this kind are met with in all the species analogous to *Sphæria herbarum*, described in my third decade of the *Micromycetes*, which with its analogues constitutes a most distinct genus.

I have thus indicated the elements which may be made use of in the needful reform of the *Sphæriaceæ*; though I am but a gleaner in this vast field, I yet think myself able now, at least partially, to propose some very distinct genera, making use—

I. Of the characters which may be derived from the figure of the stroma, if determinate, and of the texture of the perithecium.

II. Of the properties of the nucleus, the asci and paraphyses.

III. And especially of the structure of the sporidia, of their number in each ascus, and of the manner in which they are dispersed.

It may afterwards be possible to limit the genera without having recourse to the stroma and perithecia, that is to say, when the analysis of the parts of the fructification in most if not all of the known species is completed; and if any reply to me that it is injurious to science to multiply genera, although founded on im-

* Observed I believe for the first time by Montagne in *Thamnomyces rostratus*, Pl. Cellul. Exot. 2 cent. Ann. d. Sc. Nat. vol. xiii.; and by Corda in *Sph. Hugelii*, Icon. Fung. Fasc. 4.

portant characters, and there are always too many who fly from minute and conscientious analysis, I would advise them to return to the golden age in which no generic difference was recognised between *Lycoperdon*, *Lycogala* and *Sphæria*.

In the meantime, to confirm by some examples the reasonableness of the innovations which I am meditating, I subjoin the descriptions of some genera belonging to the *Aplosphæriæ*.

I. Venturia.

Perithecia crustacea, fragilia, globoso-depressa, poro rotundo amplo pertusa, circa ostiolum setulis rigidis longiusculis hispida, fundo ascigera. *Asci* fixi erecti oblongi ellipticive, in basim breviter abrupteque tenuati, fere pedicellati octospori. *Paraphyses* nullæ. *Sporidia* constricto-didyma bilocularia, articulis subæqualibus, episporio pertenui endosporio vix translucido papyraceo fuscescente.

I dedicate this genus, of which I know two species, to the enlightened Sig. Antonio Venturini of Brescia, an excellent mycologist.

1. *Venturia Rosæ* : sporidiorum fusco-castaneorum loculis inæqualibus obtusis, inferiore minore.

It grows on the dead boughs of the *Rosa alpina* at Mt. Cenis.

It appears to have a great analogy with the *Sphæria strigosa* of Albertini and Schweinitz (Conspect. Fung. p. 33. n. 3. tab. 5. fig. 7. *a, b, c*) ; nevertheless it differs from it in not being entirely invested with bristles, in the depresso-globose perithecia, instead of globose or ovate, and still more by their rather ample and not papillated ostiolum.

2. *Venturia Dianthi* : sporidiorum atro-fuscorum loculis subæqualibus ovato-subacutis.

On the dried stalks of the *Dianthus carthusianorum*, or within their cavity.

The two species agree together admirably in the manner of their development, bursting through the epidermis, which at first covers them, in the form of the ostiolum, which is surrounded by rigid bristles, in the structure of the perithecium and the nucleus, in the absence of paraphyses, in the asci, which are strongly attenuated at the base, in the bilocular brown sporidia, veiled by an episporium, which is almost confluent with the papyraceous endosporium, and are easily distinguished by the shape of the sporidia without having recourse to the dimensions of the perithecia and the matrix, from which, if we were to take the distinctive characters, the one, *V. Rosæ*, would belong to the *Villosæ*; the other, *V. Dianthi*, to the *Caulicolæ*.

II. Massaria.

Perithecia coriacea cortici immersa, globoso-depressa, vertice attenuata, ostioloque erumpente papillæformi prædita, in sicco collabentia. *Asci* clavati, fixi grandes octospori. *Paraphyses* filiformes flaccidæ intertextæ. *Sporidia* subbiserialia, majuscula ovata, episporio hyalino crasso, endosporio papyraceo castaneo-fusco triloculari, loculis inæqualibus, superiore majore subhemisphærico, medio subgloboso, extimo minore hemisphærico ascis vertice dehiscentibus copiose profluentia, atro inquinantia.

I dedicate this genus to the memory of the late Dr. Massara, author of the 'Flora Valtellinese.'

Massaria inquinans. *Sphæria inquinans*, Tode Fung. Mecklenb. ii. p. 17. n. 13. tab. 10. fig. 85, rather bad and incomplete; Schmidt and Kunze, Exsicc. n. 180! according to a specimen from the enlightened Kunze; Fries, Syst. ii. p. 486; Sclerom. Suec. ed. 2. n. 304. *Spilobolus inquinans*, Link, Handb. iii. p. 380.

It grows on the dead branches of the sycamore.

The perithecia of this species are a millimetre in diameter, and grow under the soft bark of the young boughs of the sycamore, sometimes solitary, sometimes in pairs or in clusters of many individuals. On their upper surface they are clothed with a fuliginous down, a peculiarity not included in the generic characters, because it is sufficiently distinguished by the episporium of considerable thickness and the form of the endosporium.

The celebrated Link, in the 'Handbuch zur Erkennung,' l. c., has proposed a new genus among the *Sphæriaceæ*, under the name of *Spilobolus*, characterizing it merely by the way in which the sporidia are evacuated from the perithecia. He refers to it *Sp. inquinans*, *S. Xylostei* and *S. Tiliæ*, three species which have no affinity together. Suffice it to say, *Sp. Tiliæ* belongs to the compound *Sphæriæ*, and the part which Link and many other authors have described as a perithecium is nothing more than a stroma of a determinate figure.

III. Rosellinia.

Perithecia globosa in strata bina facile secedentia, crustacea, fragilia, stromate effuso filamentoso plus minusve contexto fuscescente insidentia, ostiolo papillari minuto prædita. *Asci* fixi, octospori, lineares paraphysesque filiformes flaccidæ ex tota superficie interiori perithecii nascentes. *Sporidia* reniformia, episporio tenui, endosporio fusco-badio, vix diaphano subpapyraceo, septo medio obscuro bilocularia.

Dedicated to Dr. Ferdinando Pio Roselline of Pisa, a great cultivator "dell' amabile scienza."

Rosellinia aquila. *Sp. aquila*, Fries, Syst. ii. p. 442.

On the dried stems of the larger umbelliferous plants in the plains of Southern Sardinia.

I cannot assert the identity of my specimens with the species of Fries, not having been able to compare their fructification; my plant differs from the *Byssisedæ*, under which name other really distinct species are perhaps confounded. *Sp. aquila* has been found hitherto on rotten branches only, and has therefore been referred to *Byssisedæ*: my specimens might be ranked with *Caulicolæ*.

IV. Bertia.

Perithecia erumpentia oblonga ovoideave, stromate effuso atro crustæformi insidentia, cellulis mediocribus subrotundis contexta, fere suberosa, tenacia, rugoso-verrucosa; in sicco rugoso-tuberculata, rigida, ostiolo inconspicuo vel saltem minutissimo prædita. *Asci* creberrimi octospori, fixi, cito evanidi. *Paraphyses* tenuissimæ. *Sporidia* hyalina, cylindracea, utrinque obtusa, curvula, endosporio ab episporio haud distincto, septo medio bilocularia.

I have named this genus after Dr. Giuseppe Berti of Porto Maurizio, to whom I owe numerous collections of cryptogams from Eastern Liguria.

Bertia moriformis. *Sph. moriformis*, Tode Fung. Mecklenb. ii. p. 22. n. 19. tab. 11. fig. 90. *a, b, c*, tolerably correct but incomplete; Fries, Syst. ii. p. 458; Sclerom. Suec. ed. 2. n. 125.

Found for the first time in Italy by my illustrious friend Baron Vincenzio Cesati. A species common in other parts of Europe, but very variable in its mode of growth and in size; nevertheless the nucleus, the asci and the sporidia always preserve the same characters in solitary individuals as well as in those which are clustered together; a fact, be it observed, which supports the maxim I have tried to establish, and which I hope in the sequel to be able triumphantly to demonstrate.

In the distinction of the genera and species we ought to set the highest value on those characters which are drawn from the form and structure of their sporidia.

XXXI.—*Notes on the genus of Insects* Sitona, *with descriptions of two new Species.* By John Walton, Esq., F.L.S.

Fam. CURCULIONIDÆ.

Genus Sitona, *Germ., Steph.*; Sitones, *Schönh.*

§ A. *Eyes subdepressed.*

1. *Sitona hispidula*, Fab., Germ., Steph., Schönh.
   — *pallipes*, Steph.
   Curc. hispidulus, Marsh., Gyll., Kirb. MSS.

The subimmersed eyes, and the erect rigid hairs scattered on